

Study Programme Description for the Field of Study: Information Technology first-cycle studies in English

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Basic information on the field of study and the study programme

Organisational unit responsible for the field of study	Faculty of Applied Information Technology
Field of study	Information Technology
Level of study	First-cycle studies
Education profile	Practical profile
Type of study	full-time studies
Academic discipline(s) to which the field of study is assigned	Engineering and technology – discipline: information and telecommunication technology (100%)
Academic year	2026/2027
Number of semesters	6
Language of instruction	English
Professional title awarded to graduates	Bachelor's degree
The requirement for completing the programme and obtaining a degree is a pass mark for the and passing the final examination	

Number of contact hours and ECTS credits for individual study pathways

Specialisation: Computer Science	full-time
Total number of contact hours	2 483
Physical education hours	60
Vocational apprenticeship hours	960
ECTS credits:	
Total number of ECTS credits required to complete the degree	181
ECTS credits obtained through courses involving direct participation of academic staff or other instructors	95 (53 %)
ECTS credits obtained through courses in the humanities or social sciences	5
ECTS credits awarded for practical skills-oriented courses	116 (64 %)
ECTS credits obtained through elective courses	61 (34 %)

Specialisation: Cybersecurity	full-time
Total number of contact hours	2 524
Physical education hours	60
Vocational apprenticeship hours	960
ECTS credits:	
Total number of ECTS credits required to complete the degree	181
ECTS credits obtained through courses involving direct participation of academic staff or other instructors	97 (54 %)
ECTS credits obtained through courses in the humanities or social sciences	5
ECTS credits awarded for practical skills-oriented courses	116 (64 %)
ECTS credits obtained through elective courses	61 (34 %)

Educational concept and learning objectives

The educational concept aims to prepare a highly qualified workforce of IT specialists. The goal of the programme is to provide students with up-to-date IT knowledge and practical skills that enable them to develop, configure, and manage hardware and software at the highest possible level while maintaining the security of IT systems, to foster impeccable ethical and moral standards, and to develop the ability to organize their own work and that of an entire team.

The curriculum for the Information Technology program (Bachelor's degree) focuses on content related to algorithmic and computational thinking. Studies in this field provide practical exposure to the methods and technologies used by computer scientists. They also enable students to acquire theoretical and practical knowledge of the latest IT solutions applied in various areas of life.

The main educational objectives of the programme are:

- 1) To provide comprehensive knowledge in the fields of technical sciences (mathematics, physics, fundamentals of electronics and electrical engineering) as well as discipline-specific knowledge (including algorithms and data structures, computer system architecture, programming languages and paradigms), enabling a proper understanding of the principles governing modern computer science,
- 2) To prepare graduates to engage in entrepreneurial activities aimed at establishing their own businesses, as well as to perform specialized tasks in various positions within businesses related to their chosen specialization,
- 3) To foster attitudes of responsibility, openness, and an innovative approach to problem-solving, as well as an understanding of the need for continuous professional development.

The educational concept is consistent with the Mission and Vision of the University of Information Technology and Management in Rzeszów, approved by a resolution of the WSiIZ Senate, in the following areas:

- educating students to meet the needs of the information society and the knowledge economy, equipping them to create new economic, social, and cultural value, while prioritizing society's needs (and the related needs of the labor market) in terms of acquiring the knowledge and skills essential for work as an IT specialist.

- fostering in students the aptitudes necessary to function in a society undergoing constant transformation, enabling them to maintain, throughout their professional lives, an openness to change, innovation, creativity, and a desire for continuous professional development,
- preparing students to contribute to the economic and societal advancement of the region by fostering innovative and entrepreneurial attitudes, as well as flexibly equipping them to navigate the labor market effectively.

Educational activities in the Information Technology program are specifically aimed at achieving the University's strategic objectives under Priority I: *"Conducting an educational process that ensures graduates possess high-level competencies."* The extensive use of active teaching methods in the curriculum and study program makes the educational process more practical and provides conditions for the development of students' competencies and creativity. A significant portion of the classes will be taught by practitioners.

At the same time, the academic and teaching staff of the program are engaged in collaboration with business entities on projects and thesis work, which enhances the staff's qualifications and stimulates innovative activities. Through these and other activities, the University will achieve another of its strategic goals: leveraging the potential of WSliz's economic environment for the University's development.

A very important element of modern education is conducting scientific research. Ensuring the involvement of the program's academic and teaching staff in scientific research will allow for the proper application of the potential of the academic community (both staff and students) and the scientific research infrastructure (specialized laboratories).

For many years, the demand for qualified IT engineers has remained very high, and the continuous expansion of technology companies' branches in Poland is only fueling this trend. The dynamic evolution of innovation means that the job market is constantly generating new positions. Today, the industry is not only looking for versatile programmers but is also showing a strong demand for experts in cybersecurity, analytics and data engineering, automation (e.g., testing), and agile project team management.

Although interest in IT specialists in Poland shows no signs of waning -and they still account for a huge percentage of all recruitment efforts – the structure of the sought-after skills has changed. Positions related to cloud engineering and DevOps have now replaced traditional roles, such as basic help desk support or classic systems administration. Another clear trend in the market is the growing wage gap: due to high project requirements, the salaries of experienced experts (senior professionals and architects) are many times higher than the rates offered for junior positions, reflecting their strategic value to the business. The labor shortage is a direct result of the growing gap between the economy's demand for high-caliber specialists and the still-insufficient number of graduates ready to work with the latest technologies. The market is particularly lacking engineers with in-depth knowledge and practical skills in areas such as artificial intelligence (AI), cybersecurity and embedded systems. Leading recruitment portals consistently list software developers, cloud and network engineers, security specialists, and data architects as the most in-demand professions. Importantly, it is no longer just global technology corporations and service companies (such as Cisco, IBM, Sii, Atos, and Nokia).

A summary of the above data clearly shows that, both in the Podkarpackie Voivodeship and throughout Poland as well as in Europe, there will be a shortage of IT professionals in the broad sense of the term, and the gap between the number of job openings and the number of educated, competent IT specialists will continue to grow. The program-specific learning outcomes have been designed to educate IT specialists competent in providing software support, cybersecurity, systems and network management, database management, and the design and programming of embedded systems.

The Information Technology programme is classified under a single discipline: technical computer science and telecommunications Information Technology.

In accordance with the educational concept, studies in the Information Technology programme are conducted based on knowledge and practical skills, in conjunction with scientific and research activities conducted at the Faculty of Applied Information Technology, taking into account development trends in the discipline of technical computer science and telecommunications, and enabling the achievement of learning outcomes in terms of knowledge and skills related to professional, and research competencies.

Graduate profile

The characteristics of Information Technology graduates can be described as follows:

They possess a system-level perspective. The content of individual course units typically focuses on specific concepts and skills, which can lead to a fragmented view of the discipline. Information Technology graduates must develop the ability to understand systems as a whole at a high level. This understanding must go beyond the implementation details of individual components and comprise the structure of computer systems as well as the processes involved in their design and analysis.

They understand the connections between theory and practice. A fundamental aspect of Information Technology is the balance between theory and practice and the nature of the relationship between them. Information Technology graduates must understand not only the theoretical foundations of the discipline but also how theory influences practical application.

They possess knowledge of general topics and principles. Throughout the programme, students encounter many recurring themes, such as abstraction, complexity, and evolutionary changes. They will also encounter principles, such as those related to caching, shared resource management, security, concurrency, and so on. Graduates should recognize that these concepts have broad applications in the field of computer science and should not limit their relevance solely to the specific areas in which they were introduced.

They have significant project experience. To ensure that graduates can successfully apply the knowledge they have acquired, all students in IT programmes should be involved in at least one significant project. Such a project (usually placed later in the programme) demonstrates the practical application of the principles learned in various modules and requires students to integrate the material mastered at different stages of the learning process. Students must recognize the need for domain-specific knowledge for certain applications, which may require additional study of topics in the relevant field.

They focus on critical evaluation. It applies principles of best practice, which include planning, tracking progress, measuring, and overall quality management.

They possess adaptability. One of the fundamental characteristics of IT in its relatively short history has been the rapid pace of change. Graduates of IT programmes must have a solid foundation that will enable and encourage them to maintain their skills as information technology evolves.

Graduates possess knowledge of developing information technology systems and their applications, as well as the operation of modern computer systems, the fundamentals of computer science, operating systems, computer networks, computer graphics, databases, and software engineering. This knowledge enables them to actively participate in the implementation of various types of IT projects. They are familiar with classical and modern IT methods and how to implement them in science and the economy. In addition to their IT training, they also have a background in mathematics and specialized fields useful for technical applications. They also possess computer programming skills and the ability to work in programming teams. They are capable of programming mobile devices (Android, iOS).

Graduates of IT may find employment at companies involved in the development, implementation, or maintenance of IT tools and systems, as well as at other companies and organizations where such tools and systems are used. They are prepared to encrypt and decrypt data, secure IT systems, and ensure the secure transmission of data over networks. Graduates will be prepared for lifelong learning and professional development, as well as for master's-level studies in related fields. They will also have the foundation to pursue a career as independent entrepreneurs.

The program offers the following specializations:

- Computer Science – the specialization offers a wide selection of courses reflecting trends in the IT industry and gives students the opportunity to choose their profile more flexibly.
- Cybersecurity – students learn to identify potential threats, implement appropriate security measures, respond to security incidents, and ensure the confidentiality, integrity, and availability of information.

Rules and organization of vocational apprenticeships

Students are required to complete a vocational apprenticeship in accordance with the requirements and number of hours specified in the study programme for a given field, level and profile of studies. The rules governing the organisation and completion of vocational apprenticeships are specified in the Regulations for Student Vocational Apprenticeships constituting an attachment to the Rector's Order .

The organisational unit of the University supporting the organisation of vocational apprenticeships is the Vocational Apprenticeship Office, headed by the University Coordinator for Vocational Apprenticeships. Students are assigned to vocational apprenticeships by the coordinator responsible for vocational apprenticeships within a given field of study, hereinafter referred to as the "Coordinator" (such a person must hold qualifications in the relevant field of study or have at least three years of experience as an academic teacher in the given field of study). Students may independently find a place to complete their vocational apprenticeship or use the database of employers cooperating with the University, maintained by the Vocational Apprenticeship Office and the Careers Service.

A student wishing to commence a vocational apprenticeship receives a Vocational Apprenticeship Record Sheet from the Coordinator, which is submitted to the employer together with the apprenticeship card. The employer confirms whether the nature, scope of activity and workplace equipment will enable the student to achieve the intended learning outcomes. The decision regarding the possibility of completing the vocational apprenticeship at a given workplace is made by the Coordinator. The student completes the vocational apprenticeship on the basis of a tripartite agreement concluded between the University, the employer and the student.

The vocational apprenticeship takes place during the summer break or during the academic year, provided that it does not prevent the student from attending classes. During the vocational apprenticeship, the Coordinator conducts visits at workplaces in order to verify the proper course of the apprenticeship. Student attendance during the vocational apprenticeship is obligatory. No more than five days of justified absence during a given stage of the vocational apprenticeship are permitted. The apprenticeship may be extended by the duration of the justified absence. Absence during the apprenticeship is justified by the Coordinator.

During the apprenticeship, the student keeps a Vocational Apprenticeship Logbook. The apprenticeship is completed and assessed by the Coordinator based on the Vocational Apprenticeship Logbook and the Evaluation Sheet, in which the workplace supervisor evaluates the extent to which the student has achieved the learning outcomes during the apprenticeship.

The Regulations for Vocational Apprenticeships specify the cases and conditions under which the University may, upon the student's request, recognise activities performed by the student as part of employment, traineeship or voluntary work as equivalent to the vocational apprenticeship (provided that these activities enabled the achievement of the learning outcomes specified in the study programme for vocational apprenticeships).

Students can complete apprenticeship at organizations, organizational units, or government agencies whose departments are related to the IT or telecommunications industries and are involved in the maintenance and support of IT equipment or systems. Apprenticeships may also take place at consulting and outsourcing firms that provide IT consulting and support services to other companies.

Vocational Apprenticeship, part 1

No.	Description of Learning Outcomes	Reference to learning outcomes for the programme
Upon completing the internship, the student, in terms of KNOWLEDGE		
P_W01	is familiar with the current state and latest trends in the development of information technology	K_W12
Upon completing the internship, the student, in terms of SKILLS		
P_U01	can work individually and in a team, communicating through various communication channels; can estimate the time needed to complete an assigned task; can develop a schedule and complete work ensuring that deadlines are met	K_U02
P_U02	can communicate the results of their activities using various communication	K_U04

	methods and techniques	
P_U03	can complete a practical IT task	K_U14
P_U04	when formulating and solving tasks involving the design of IT solutions, can take into account their non-technical aspects	K_U15
Upon completing the internship, the student, in terms of SOCIAL COMPETENCES		
P_K01	is trying to improve their professional and social skills	K_K01
P_K02	takes into account the non-technical aspects and consequences of IT work	K_K02
P_K03	behaves professionally toward coworkers and clients	K_K03
P_K04	is aware of the social role of a graduate of a technical university, including formulating and communicating to the public – inter alia through the mass media – information and opinions concerning achievements in computer science and other aspects of a computer scientist's work in a manner that is widely understood	K_K06
P_K05	solves problems that arise during the execution of a task	K_K07

Vocational Apprenticeship, part 2

No.	Description of Learning Outcomes	Reference to learning outcomes for the programme
Upon completing the internship, the student, in terms of KNOWLEDGE		
P_W01	is familiar with the current state and latest trends in the development of information technology	K_W12
P_W02	has knowledge and understanding of the principles of selecting and specifying criteria, standards and norms that enable the effective planning of strategies to solve specific problems	K_W14
Upon completing the internship, the student, in terms of SKILLS		
P_U01	can evaluate an IT solution in the context of general qualitative and quantitative features	K_U07
P_U02	can complete a practical IT task	K_U14
P_U03	when formulating and solving tasks involving the design of IT solutions, can take into account their non-technical aspects	K_U15
P_U04	Is able to assess the suitability of routine methods and tools for solving IT tasks, typical for the studied specialty, and to select and apply appropriate methods and tools	K_U16
P_U05	can maintain the equipment and systems typical of their field of study	K_U18
Upon completing the internship, the student, in terms of SOCIAL COMPETENCES		
P_K01	takes into account the non-technical aspects and consequences of IT work	K_K02
P_K02	adapts to the assigned role within the team and shares responsibility for the tasks being carried out	K_K04
P_K03	is proactive in taking action and proposing ideas when carrying out tasks	K_K05
P_K04	solves problems that arise during the execution of a task	K_K07

Methods of verifying and assessing the learning outcomes achieved throughout the programme of study

The University's system for verifying and assessing the extent to which students have achieved the learning outcomes consists of:

- ongoing verification and assessment of the learning outcomes achieved by students during assessments and examinations in individual courses undertaken during the semester,
- ongoing verification and assessment of the student's learning outcomes during vocational apprenticeships,
- final verification and assessment of the student's learning outcomes during the preparation of their dissertation and during the final examination.

The choice of methods for verifying and assessing learning outcomes is determined by the nature of the learning outcomes intended to be achieved within a given course. The aim of the various forms of teaching delivered as part of a course is for the student to achieve specified learning outcomes in knowledge, skills, and social competencies. Depending on the nature (category) of the learning outcome being assessed, the following methods, amongst others, are used during the ongoing assessment and evaluation of the student's learning outcomes:

- 'knowledge' category – written assessment methods (tests comprising closed or open-ended questions), oral assessment methods based on open-ended questions,
- 'skills' category – workshops (including laboratory work) based on carrying out practical tasks or problem-solving (problem-based learning), the project method, the case study method, educational simulation games, the observation method,
- 'social competencies' category – the project-based method, educational simulation games.

When preparing tools for assessing learning outcomes, academic staff and other course leaders draw on the provisions of the course outlines (which include, amongst other things, information on the course objectives, course-specific learning outcomes, course content, assessment methods and criteria for evaluating the degree to which individual learning outcomes have been achieved) and on the guidelines set out in the Rector's Regulation on the Preparation of Evaluation Tools for the Learning Outcomes.

The key method used during the ongoing monitoring and assessment of students' learning outcomes whilst undertaking vocational apprenticeships is observation in real-life settings, which involves analysing students' performance as they carry out tasks arising from the learning outcomes. The outcome of the task is assessed in terms of its quality and the correctness of the procedure used to solve or complete it.

The final verification and assessment of the student's learning outcomes takes place during the preparation of the student's dissertation and during the final examination. Given the practical nature of the education profile, students are required to undertake practical dissertations in line with their field of study and chosen specialisation. The aim of the dissertation is to solve a practical problem (for first-cycle studies) or a research problem based on applied research methodology (for second-cycle studies). The assessment criteria for the dissertation relate to its substantive content and editorial quality. Both these aspects are defined by the learning outcomes set out in the course outline for the *Diploma Seminar*. A detailed elaboration of the rules can be found in the Rector's regulation on *Diploma Theses and Diploma Examinations*, which is updated annually. The thesis supervisor and the examiner assess the thesis independently of one another. The assessment covers, amongst other things, the relevance of the content to the thesis title, mastery of thesis-writing techniques and stylistic and linguistic correctness, an original approach to the problem or topic, and the selection and use of sources. To ensure the practical nature of theses, selected assessment criteria are treated as 'critical'; that is, if a negative mark is awarded for any of these aspects of the thesis, the review (assessment) cannot be positive – these are: the assessment of the practical character of the thesis and the substantive assessment of its content.

The second stage of the final assessment is the oral thesis examination, which comprises the student's presentation of their thesis, a discussion of a selected topic related to the thesis, and the student's response to a problem-based question aligned with the field of study's learning outcomes.

The primary methods of documenting students' learning outcomes at various stages of the educational process are: examination and assessment papers, completed projects, work placement logs, and dissertations. To safeguard this documentation, course lecturers are required to submit students' stage-based work to the University's designated organisational units, where it is retained for 2 years. Documentation related to vocational apprenticeships is retained by the Vocational Apprenticeship Office, whilst dissertations are stored in the University's IT system.

Course catalogue

This chapter contains information on the courses included in the study programme for the field of study in Management, first-cycle studies, together with the learning outcomes assigned to them (see Attachment:

Matrix of Learning Outcomes) and the course content ensuring the achievement of these outcomes. In accordance with Interpretative Opinion No. 10/2022 of the Presidium of the Polish Accreditation Committee of 9 June 2022, this fulfils the requirement specified in § 3(1)(3) of the Regulation of the Minister of Science and Higher Education of 27 September 2018 on studies, which states that: "The study programme shall specify (...) courses or groups of courses, regardless of the form in which they are delivered, together with the assignment of learning outcomes and course content ensuring the achievement of those outcomes."

All-University Courses

English for Specific Purposes

Prerequisites (derived from the sequence of subjects):

- Language level – B1+ according to European Framework of Reference for Languages

Course content:

- Developing vocabulary resources in accordance with the textbook applicable to the level, taking into account the vocabulary of the area of study.
- Grammatical structures in accordance with the textbook applicable to the level.
- Practice reading comprehension in accordance with the textbook applicable to the level, taking into account topics from the area of study.
- Practice listening comprehension in accordance with the textbook applicable to the level.
- Developing the ability to prepare oral statements (e.g., presentations) in accordance with the textbook applicable to the given level, taking into account topics from the area of study.
- Developing the ability to prepare written statements in accordance with the textbook applicable at the given level, taking into account the subject

Digital Safety and Awareness

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Information culture and disinformation in the age of algorithms:
 - Basic concepts: information culture, information literacy, infodemic.
 - Post-truth: causes, manifestations, consequences for public debate and civil society.
 - Fake news: origins, dissemination mechanisms, the attention economy.
 - GenAI-assisted disinformation — deepfakes, synthetic content, LLM-based "content farms"; how to distinguish generated content from authentic content.
- Data privacy and security in the digital world:
 - Digital footprint, personal data vs. behavioral data.
 - The business model of digital platforms (so-called surveillance capitalism), profiling and content personalization.
 - Legal foundations: GDPR, user rights, informed consent.
 - Practical security principles: passwords, multi-factor authentication, privacy settings, phishing and social engineering risks.
 - Data in the context of GenAI tools — what happens to data entered into chatbots, risks of confidential information leaks.
- Digital hygiene and psychological wellbeing:
 - What is digital hygiene — principles, boundaries, digital detox.
Smartphones, social media and mental health: addictive mechanisms (infinite scroll, variable reinforcement).
Cyberstress, FOMO, the "always on" attitude, digital burnout.
 - Impact on sleep, concentration, social relationships and self-image (social comparison).
Practical strategies: digital wellbeing, notification management, mindful use.
- GenAI: opportunities, risks, and responsible use:
 - How generative models work — non-technical fundamentals, hallucinations, limitations.
 - Risks: erosion of critical thinking, overreliance on AI, bias in training data, impact on education and work.
 - Ethical aspects: copyright, transparency, accountability for AI-generated content.
 - Principles of responsible and healthy GenAI use — when AI helps, when it harms.

Fundamentals of Economics

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- The concept and subject matter of economics. The origins and development of economics as a science. Microeconomics and macroeconomics. Positive and normative economics.
- The concept, functions and mechanisms of the market. Demand and its determinants. Supply and its determinants. Market equilibrium.
- Economic aspects of running a business. Business costs. Market structures.
- The circular flow of income and measures of social output. Economic growth and development.
- The labour market, unemployment and inflation in the economy.
- The money market and selected financial market institutions.
- The economic significance of gender equality.

Personal Business Model

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- **Self-reflection – analysis of personal resources:** Finding your WHY and discovering key elements of professional identity through an analysis of interests, personality, skills and values. Identifying personal preferences regarding the work environment. Defining professional identity on the basis of identified preferences and personal resources. Work based on Module 1 in the Booklet and tests available on the Competence Development Platform.
- **Prototyping a selected job position – analysis of job advertisements:** Introduction to the concept of the Personal Business Model and the Job Business Model Canvas (JBMC). Working with the JBMC in the context of a selected job position. Using job advertisements as a source of data for the JBMC. Work based on Module 2 in the Booklet and job offers for the selected position.
- **Prototyping a selected job position – analysis of information from career portals and AI tools:** Working with AI tools (e.g. ChatGPT) and descriptions on career portals (including onetonline.org, MyNextMove and Mapa Karier) to refine and supplement information about the characteristics of the selected position. Identifying typical duties, required personal resources and the work environment. Completing the missing elements of the Job Business Model Canvas. Work based on Module 3 in the Booklet.
- **Analysis of gaps in personal resources:** Comparing personal resources with the requirements of the selected position. Identifying gaps in the skills, knowledge and traits necessary to work in the desired profession. Analysing the fit between the student's preferences and the work environment. Developing ideas for growth and a plan for closing competency gaps. Work based on Module 4 in the Booklet.
- **Elevator pitch:** Preparing a self-presentation (elevator pitch) and delivering it to the group. Formulating a personal value proposition in the context of the selected profession. Linking personal resources to the employer's needs. Delivering an oral presentation. Work based on Module 5 in the Booklet.
- **Creating a Development and Individualised Educational Pathway Plan:** As part of the project, each student develops a plan for the development and individualisation of their educational pathway, based on the results of work completed in the Booklet and the completed Job Business Model Canvas (JBMC). The project includes a summary of the analysis of gaps in personal resources and the identification of key areas for development. The student identifies the most important courses in the study programme and selects a specialisation that best matches their interests and career goals. The project is supplemented by a selection of additional development resources, including online training, educational materials, books, events and activities that enable the student to test the selected career path in practice. The project is individualised and aims to support informed career planning based on the student's resources, labour market needs and personal aspirations.

Protection of Intellectual Property

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- The origins and concepts of intangible assets, intellectual property and industrial property, and mechanisms for their protection under domestic and international law.
- The subject matter of copyright: works and their types. Copyright holders.
- Moral and economic rights in copyright.
- Plagiarism: its definition, nature and types, and the associated legal liability.
- Claims arising from copyright infringement.
- Industrial property assets: their types and protection under domestic and international law.
- Issues concerning the operation of artificial intelligence in the context of intellectual property law.

Academic Writing Skills

Prerequisites (derived from the sequence of subjects):

- Subjects whose scope includes the methodological aspect of solving IT problems

Course content:

- Analysis of the latest development trends in computer science
- Methodologies/procedures for solving engineering/IT problems
 - o analysis of the stages of the classical problem-solving model
 - o analysis of the stages of the classical product life cycle model,
 - o analysis of methodologies used during problem solving in different areas
- Substantive and formal aspects of writing a thesis.
- Substantive aspects.
- Stages of writing a thesis (the stage of determination, exploration, decision):
 - o development of a substantive plan (selection of the problem area, formulation of the problem and definition of the objectives of the work, formulation of a working variant of the topic of the work, definition of a schedule of activities),
 - o analysis of source materials,
 - o writing the main part of the thesis (text structure and the importance of the paragraph, style and language of the thesis, footnotes - types of footnotes, citations),
 - o final proofreading of the content of the thesis (development of the Conclusion and final editing of the Introduction and the topic of the thesis, preparation of the literature list, language proofreading).
- Formal aspect (instructions for writing a paper applicable at the University):
 - o LATEX as a document development system
 - o Text formatting, margins, automatic table of contents,
 - o formulas, figures (including charts, graphs, diagrams, photos), tables and rules for signing them,
 - o footnotes and list of literature.

Health and Safety while Studying

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Selected legal regulations concerning occupational health and safety, including the rights and responsibilities of students and university staff.
- Ergonomic guidelines for setting up a safe study workstation with a computer and other equipment. Psychological guidance on learning and organising work (the Pareto principle in learning, the primacy and recency effects, study breaks, the forgetting curve, the role of repetition, daily intellectual rhythms, conditions for effective mental work, and overcoming memory blocks). Applying effective mental work techniques, including mnemonic techniques. Opportunities and risks associated with remote education.

- Hazards arising from dangerous, harmful and burdensome factors present in work and learning processes, and methods of protection against them. The nature and types of cybersecurity and mental health risks (the model of psychological well-being).
- Procedures to follow in the event of accidents and emergencies (including fires and equipment failures), as well as the principles of providing first aid in the event of an accident.

Civilization Challenges

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Industrial civilisation as a civilisation of waste: a brief historical overview and the current situation
- Climate change and the decline in biodiversity on Earth and their anthropogenic causes
- Working with and emulating the environment as the basis for the well-being of our species
- Systemic transformation towards a low-carbon economy: strategies for reducing greenhouse gas emissions in the context of climate policy and sustainable development
- Food security and the transformation of the food production system: from monocultures to sustainable supply chains
- The circular economy as a response to the waste crisis: implementation models, digital technologies and social attitudes
- A new socio-economic architecture: how to transform the organisation of society and the economy to enhance resilience, prosperity and social justice
- Artificial intelligence (AI), social media and new technologies in health and illness
- Behavioural patterns and premature mortality; the social environment and health
- Twenty-first-century epidemics: hypertension, cancer, obesity and infectious diseases
- Mental health
- What can be done to maintain good health: is health promotion sufficient?
- Food: its functions, types and health value, and nutrition-related diseases
- Principles of healthy eating, sources of food-related health risks, and types of diets used to prevent selected lifestyle diseases

Physical Education

Part 1

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Athletics. General fitness exercises, warm-up, running, jumping and throwing. Rules.
- Volleyball. Receiving and passing the ball using the overhead pass and forearm pass; serving and serve reception. Tactics: basic court positioning when serving, covering the block by the middle-back defender, covering one's own attack, practice games and regular play. Rules of the game.
- Football. Receiving the ball while stationary and while running; striking the ball with the inside of the foot and the instep; heading and dribbling. Tactics: set plays, including free kicks, corner kicks and penalty kicks; simplified games and regular play. Rules of the game.
- Basketball. Passing, catching, set shots, jump shots, lay-ups and dribbling. Tactics: man-to-man defence, structured offence, simplified games and regular play. Rules of the game.
- Movement classes to music: aerobics, step aerobics, callanetics, exercises with equipment and stretching.
- Specialist strength training in the gym.
- Nordic walking, walk-run training and cross-country running – techniques.
- Tennis, table tennis and badminton. Techniques and rules of the game.

Part 2

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Athletics. General fitness exercises, warm-up, running, jumping and throwing. Rules.
- Volleyball. Receiving and passing the ball using the overhead pass and forearm pass; serving and serve reception. Tactics: basic court positioning when serving, covering the block by the middle-back defender, covering one's own attack, practice games and regular play. Rules of the game.
- Football. Receiving the ball while stationary and while running; striking the ball with the inside of the foot and the instep; heading and dribbling. Tactics: set plays, including free kicks, corner kicks and penalty kicks; simplified games and regular play. Rules of the game.
- Basketball. Passing, catching, set shots, jump shots, lay-ups and dribbling. Tactics: man-to-man defence, structured offence, simplified games and regular play. Rules of the game.
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- Specialist strength training in the gym.
- Nordic walking, walk-run training and cross-country running – techniques.
- Tennis, table tennis and badminton. Techniques and rules of the game.

Basic Courses

Fundamentals of Mathematics with Elements of Linear Algebra

Prerequisites (derived from the sequence of subjects):

- None

Course Content:

- Elements of mathematical logic. Classical propositional calculus. Multi-valued logics
- Quantifier logic. Methods of proving theorems
- Set algebra. Numerical sets. Elements of set theory
- Cartesian product of sets. Functions as relations
- Properties of functions and operations on functions
- Linear functions. Quadratic functions. Polynomials. Rational functions. Equations and inequalities
- Exponential and logarithmic functions. Trigonometric and cyclometric functions
- Sequences and limits of sequences

Discrete Mathematics

Prerequisites (derived from the sequence of subjects):

- None

Course Content:

- Relations and their properties. Equivalence relations, ordering relations
- Introduction to fuzzy and approximate sets
- Mathematical Induction
- Recursion and recursive equations
- Number theory and divisibility. GCD and LCM algorithms. Number systems
- Congruences and modular equations. Systems of linear congruences
- Fundamentals of cryptography and encryption
- Set counting and basic combinatorial methods
- Elements of discrete probability

Mathematical Analysis

Prerequisites (derived from the sequence of subjects):

- Fundamentals of Mathematics with Elements of Linear Algebra

Course Content:

- Vectors. Linear independence of vectors and a basis
- Matrices. Matrix algebra
- Determinant of a matrix and its properties. Inverse matrix. Rank of a matrix
- Applications of matrices
- Systems of linear equations. Kronecker–Capelli theorem. Number of solutions to systems of linear equations
- Limits of functions
- Derivatives of functions and their interpretation
- Elements of analyzing the behavior of functions
- Indefinite integrals
- Definite integrals and their applications
- Functions of several variables. Partial derivatives of functions of two variables

Fundamentals of Statistics

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Structural analysis based on classical and positional parameters—e.g., measures of location, dispersion, and asymmetry
- Analysis of the interdependence of mass phenomena
- Analysis of the dynamics of phenomena

Introduction to Electronics and Electrical Engineering

Prerequisites (derived from the sequence of subjects):

- Physics, Mathematics

Course content:

- Attributes of selected passive elements or example power supply circuits.
- Attributes of circuits built on an integrated operational amplifier, using an example of a voltage amplifier possibly an active filter.
- Attributes of a resonant amplifier and parameters of a signal generator built on it.
- Selected parameters of digital circuits with the example of: sequential circuits, combinational circuits or A/D and D/A converters.
- Properties of an example transistor amplifier or selected features of active elements.
- Fundamentals of circuit theory. Ohm's and Kirchhoff's laws.
- Junction semiconductor diodes.
- Operational amplifiers.
- Selected nonlinear analog circuits: resonators, oscillators, modulation and demodulation, digital-to-analog and analog-to-digital converters.
- Bipolar transistors, field effect transistors.
- Synthesis of logic circuits. Combinatorial and sequential circuits.

Physics

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Conversion of SI Units and Vector Calculus
- Mathematical description of motion, characteristics of motion, special cases of motion

- Newton's laws, laws of conservation of energy, momentum, and angular momentum
- Periodic and harmonic motion, Earth's artificial satellites, model of the Solar System
- Electric field, Coulomb's law, electric field of point charges
- Electric current, Ohm's law, work and power of electric current, Kirchhoff's laws, voltage, current, electrical circuits, equivalent resistance
- Magnetic field, interaction with electric charges and current-carrying conductors
- Electromagnetic induction, Faraday's law
- Alternating current circuits, RLC circuits, time-dependent behavior in systems containing a coil or capacitor
- Electromagnetic waves, wavelength ranges
- Introduction to laboratory work: preparing a report on a completed experiment; introduction to the analysis of measurement uncertainties.
- Measurements of fundamental physical quantities (electrical, optical, thermodynamic, wave phenomena, and properties of solids)

Law

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- The Role of Law in Society and the Economy. Principles of Law. Human Rights and Fundamental Freedoms
- The Structure of the Legal System. International Law and European Union Law. Public Law and Private Law. Sources of Law (Types and Hierarchy)
- Civil Law: Sources of Law. Characteristics of Civil Law Relationships. Principles of Contract Law. Principles of Civil Liability
- Administrative Law: Sources of Law. Characteristics of Administrative Legal Relationships. Administrative Decisions
- Criminal Law: Sources of Law. Principles of Criminal Law and Liability. Criminal sanctions
- Legal Framework for Conducting Business Activities (Legal Forms of Business, Rights and Obligations of Entrepreneurs)
- Contracts in Business Transactions
- Legal Framework for new technologies: Regulation of Digital Markets and Digital Services, Cybersecurity, and Artificial Intelligence (AI) Regulation

Major-Related and Specialty Courses

Algorithms and Data Structures

Prerequisites (derived from the sequence of subjects):

- Introduction to IT, Introduction to Programming, Fundamentals of Mathematics with Elements of Linear Algebra

Course content:

- Mathematical foundations of computational complexity of algorithms.
- Introduction to the design of algorithms
- Structure and characteristics of data structures: arrays, lists, queues, stacks, graphs. Implementation of data structures: arrays, lists, queues, stacks, and operations on these structures.
- Algorithm design methods: recursion, divide-and-conquer, dynamic programming, greedy algorithms, backtracking. Application of algorithm design methods to solve given problems.
- Design and implementation of algorithms for sorting and searching for elements in the data structures covered. Estimating the computational complexity (time and memory) of algorithms.
- Application of search and sorting algorithms to data processing problems. Implementation of graphical representations of graphs and graph traversal methods.

- Advanced graph operations and their implementation. Application of graph algorithms to transportation problems.
- Problems in the design of concurrent algorithms.

Introduction to IT

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Current trends in computer science. Introduction to LaTeX. Preparing a report in LaTeX on the topic of digital data representation – character encoding, images, audio, and video. Compression-lossless, lossy. Data compression formats. Using MS Excel to generate charts.
- Digital data – character and image encoding. Recording of audio and video. Compression-lossless and lossy. Data compression formats.
- Basic number systems and codes used in computer science. Rules for performing arithmetic operations in different number systems. Errors in arithmetic operations. Conversion of numbers between different systems. Horner's algorithm. Exercises in number conversion. Testing number conversion functions in Excel.
- Representation of real numbers: FP2 code, IEEE754 standard. Representation of real numbers. Sign-magnitude code. Complementary codes. Floating-point system.
- Fundamentals of digital circuit theory; Boolean algebra; logical functions, methods of representing logical functions, minimization of logical functions. Arithmetic and bitwise operations in selected number systems.
- Digital functional blocks – logic circuits, digital gates, sequential circuits.

Introduction to Programming

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Introduction to Python working environment, package management, run the program
- Variables and basic operators, input-output operations
- Using of conditional and iterative instructions
- Lists and working with lists
- Dictionaries and working with dictionaries
- Functions, defining functions
- Using the Numpy library
- Using the Pandas library

Programming

Prerequisites (derived from the sequence of subjects):

- Introduction to Programming

Course content:

- Introduction to Web Application Development – Development Environment: Code Editors, Browsers, Development Tools
- HTML – markup language – HTML document structure, basic HTML tags, forms
- CSS – style sheets – CSS mechanics; selectors; basic styles, units, colors, box model; positioning and layout of elements
- JavaScript – web programming language – syntax basics: data types, variables, operators; conditional statements, loops, functions; Document Object Model (DOM); manipulating the DOM with JavaScript; form validation
- Version control systems – code versioning using Git, basic operations, and typical workflow with a repository

Object-Oriented Programming

Prerequisites (derived from the sequence of subjects):

- Programming

Course content:

- Introduction to the development environment – software development in Visual Studio; organizing code within a project; the C# language and the .NET platform.
- Fundamentals of object-oriented programming – defining classes and creating objects; the concept of encapsulation and access modifiers; fields, methods, constructors; properties, auto-properties.
- Advanced object-oriented concepts – inheritance; polymorphism, virtual methods; abstraction, abstract classes, interfaces.
- Principles of object-oriented programming – SOLID principles
- Exception handling in C# – try, catch, and finally clauses
- Creating graphical user interfaces – desktop applications using Windows Forms or Windows Presentation Foundation (WPF)
- Data storage – reading and writing data to files; working with databases using Entity Framework (Code First)

Software Engineering

Prerequisites (derived from the sequence of subjects):

- Programming, Operating Systems

Course content:

- Scope and goals of software engineering. The processes that determine the success of a software project.
- Requirements engineering and the process of capturing and formalizing business, functional, and non-functional level requirements, as well as system constraints, integration constraints, and business rules for the software being developed.
- Models for managing the phases of the software development process. Software development life cycle.
- Static validation and verification, and dynamic verification and validation in the IT product delivery process.
- Designing software architecture using UML notation.
- Use case, class, state and activity diagrams in relation to the "4+1" model perspectives.
- API documentation and the process of creating it.
- Automation of activities related to the software development process.
- Creational design patterns as a concept for solving repeatedly recurring problems.
- Structured design patterns as a concept for solving repeatedly recurring problems
- Activity-based design patterns as a solution concept for repeatedly recurring problems.

Computer System Architecture

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Computer logic.
- Arithmetic of computers.
- Classic computer architecture
- Processors. Command lists. Assembler language basics. Organization of computer on assembler language level.
- Hierarchy of memory in computer systems.
- Interfaces. Magistral. External devices.
- Modern computer architectures. Multiprocessor architectures.
- Architectures and features of embedded systems. Microcontrollers. Microcontrollers programming.
- Reliability of computer systems.
- Numerical systems, logic gates, design of combination systems
- Implementation of assembler language programs for a PC.
- Implementation of assembler language programs for the microcontroller.

- Simulation and testing of the operation of a programmable logic controller (PLC).

Operating Systems

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Introduction to operating systems. Overview and classification of operating systems.
- Installation and configuration of an operating system. Working with the system shell and the operating system command interpreter.
- Process management in operating systems -process states, process description, process control, threads, concurrency. Classic synchronization problems, including the producer-consumer problem, the reader-writer problem, and the five philosophers problem.
- How operating systems work. Processor management, task scheduling.
- Memory management in operating systems, types of memory, virtual memory management.
- Input/output (I/O) device management, the I/O subsystem, methods of interaction between the central processing unit (CPU) and I/O devices.
- File systems. File system security. File access rights.
- Fundamentals of operating system administration.
- Operating system security.
- Distributed systems – distributed processing, client/server technologies, clusters, remote access, remote services.

Network Technologies (CCNA)

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Elementary principles of communication, concepts, network components and features. Network architecture
- Protocols and standards in computer networks. Protocol stacks, OSI model
- Discussing about protocol, technology and criteria. Individual layers of the OSI model
- Ethernet technology and WiFi
- IP and IPv6 protocols and addressing
- The OSI transport layer - tasks and protocols of TCP and UDP.
- Network services and the application, presentation and session layers of the OSI model
- Trends and challenges of computer networks - security, scaling, Internet of Things, virtualization, cloud computing
- Building a simple LAN network - configuration of hosts and a switch
- Applying IPv4 and IPv6 addressing in the network, using and examining DHCP protocol operations
- Connecting devices with UTP cables, including testing
- Using security measures such as SSH, Wi-Fi network security
- Network design, construction of a network simulation model, preparation of documentation

Social and Occupational Problems of IT

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Social problems of information technology: Historical development of the term „information society“, Social issues of information society.
- Professional problems of IT specialists, What is an it specialist? How to become an it specialist? IT professions. IT project management. Ethics in information technology. IT specialist on the labor market. Job searching. Plan your business.

Computer Graphics

Prerequisites (derived from the sequence of subjects):

- Mathematical Analysis

Course content:

- Concepts of light and color. Basic color models
- Image descriptors
- Basic digital image transformations (local, contextual, global)
- Basic raster graphics algorithms
- Fundamentals of affine geometry. Selected types of projection
- Fundamentals of curve and surface modeling
- Fundamentals of 3D graphics modeling
- Fundamentals of specialized graphics and programming environments for creating and editing computer graphics
- Rendering of simple 3D scenes in selected graphics tools for creating/editing 3D graphics
- Basics of computer animation in selected graphics tools for creating/editing 3D graphics

Databases

Prerequisites (derived from the sequence of subjects):

- Mathematical Analysis, Algorithms and Data Structures

Course content:

- Introduction to the issue of databases. Information models. Data modelling. Database systems
- Relational database model - definition, structure and properties. Relationship algebra
- Database query languages. Manipulating data with SQL queries. Extending SQL language with procedural programming mechanisms.
- Modeling conceptual and implementation diagrams in a relational model. Standardization of logical database schemas. Organization of files used for data storage. Indexing
- Transactions - ownership, transaction diagrams, isolation, seriality, concurrency handling and management
- Database management system: indexing (construction of dense and rare indices, tree structure B-tree), query optimization
- Scattered databases and client-server architecture. Data warehouses. Non-relational databases
- Constructing simple and complex SQL queries. Verification of results
- Instructions for manipulating data
- Implementation of databases. Data import
- T-SQL language. Declaring variables and constants. Overview of basic control structures of T-SQL language
- T-SQL Language: Triggers, stored procedures and functions, perspectives, cursors

Introduction to Artificial Intelligence

Prerequisites (derived from the sequence of subjects):

- Mathematical Analysis, Algorithms and Data Structures

Course content:

- Natural and artificial intelligence. Introduction
- Elements of machine learning. Rules and decision trees
- Object identification. Minimum distance methods
- Pattern discovery in data
- Bayesian inference
- Contemporary applications of artificial intelligence methods

Programming Project

Prerequisites (derived from the sequence of subjects):

- Introduction to Programming, Programming

Course content:

- Development of project assumptions

- Development of program specifications
- Planning the schedule for the implementation of the programming task.
- Developing the requirements specification
- Designing the programming solution
- Working with the version control system and communication tools.
- Program implementation
- Verifying the correctness and debugging the program
- Developing project documentation.
- Preparing a presentation of the created solution.

Human-Computer Communication

Prerequisites (derived from the sequence of subjects):

- Social and Occupational Problems of IT, Programming

Course content:

- The Essence of Human-Computer System (Communication) Design (Software Engineering vs. Usability Engineering; User-Centered Design; Human-Computer Interaction (HCI) as an Interdisciplinary Field)
- The evolution of interaction styles and techniques (the evolution of interfaces; the philosophy of windows—metaphors; intuitive interfaces and their characteristics)
- Psychological aspects of human-computer system design (the user in the light of cognitive psychology; the Human Processor Model; the Keystroke Level Model; GOMS and other psychological user models; the cyclical model of human-computer interaction; psychological theories of human-computer system design)
- Designing human-computer systems in the context of usability engineering (product life cycle models; stages of the product development process)

Cybersecurity Essentials

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Identification of threats using professional bases. Preparing an environment based on virtualization
- Applying methods of authentication, authorization and accounting in operating systems
- Detecting basic threats in an operating system
- Encryption and password cracking
- Examining digital signatures. Configuring secure remote access
- Securing the operating system
- Cyberspace - security actors, cybercriminals, security professionals , impact of threats on individuals, business, institutions
- Security models and standards. Basic components: confidentiality, integrity, availability
- Threats and vulnerabilities - overview
- Ensuring confidentiality - cryptography. Techniques, tools, protocols
- Ensuring integrity. Integrity control methods, digital signatures, certificates. Integrity in databases
- High availability and reliability. Methods for increasing reliability, incident response, disaster recovery.
- Securing devices and systems. Securing servers, networks. Physical security
- Threat Analysis

Team Project

Prerequisites (derived from the sequence of subjects):

- Social and Occupational Problems of IT and other subjects, whose educational results form the basis for the realization of the project content.

Course content:

- Team implementation of a practical task (specific product) solving an IT problem along with documentation
- Preparation of an outline - project specification
- Project implementation

- Development of documentation

Diploma Seminar

Part 1

Prerequisites (derived from the sequence of subjects):

- Academic Writing Skills

Course content:

- Development of a substantive plan for the thesis consisting of:
 - o analysis of the initial situation (current state, infirmity, target state),
 - o formulation of the problem,
 - o determination of the goal and scope of activities,
 - o determination of the requirements that the solution must meet,
 - o characterization of the solution concept,
 - o characterization of the procedure for implementing the solution concept (stages, methods, tools, techniques used, etc.),
 - o development of a literature list with footnotes.
- Developing a schedule of activities.

Part 2

Prerequisites (derived from the sequence of subjects):

- Academic Writing Skills, Diploma Seminar- part 1

Course content:

- Document the activities carried out in the form of a thesis consisting of the following parts:
 - o Introduction, including the purpose of the work.
 - o The main part of the work, divided into chapters (possibly subchapters), adapted to the specifics and subject of the problem (issue) solved, consisting of theoretical and practical-research parts.
 - o Conclusion.
 - o Literature.
 - o Summary.
 - o Appendices.

Specialisation: Computer Science

Game Engines and Programming Technologies

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Learning about the operating environment of the selected graphics engine
- Development of a game concept
- Creating assets for the engine, using the asset store
- Stage construction
- Script programming
- Techniques for creating animations in a game engine
- Collision detection
- Use of the physical engine
- Testing the game

Marketing and Business Aspects of Games

Prerequisites (derived from the sequence of subjects):

- None

Course content:

- Analysis of the game's business model

- Analysis of the target group of players
- Distribution channels for games
- Analytics related to online promotion
- In-game analytics - in-game marketing,
- Cross marketing
- Creating a game marketing plan
- Running a promotional campaign
- Comments and public criticism of the game

DevNet Technologies

Prerequisites (derived from the sequence of subjects):

- Algorithms and Data Structures, Introduction to Programming, Network Technologies (CCNA)

Course content:

- DevNet developer resources, use of Python language, git version control system
- Using the Unit Test framework
- Parsing XML, JSON, YAML in Python
- Integrating APIs into Python code
- Using Docker containers
- Using the Jenkins system
- Using Ansible to automate the installation process
- Automated testing using pyATS and Genie
- Using the NETCONF and RESTCONF model
- Designing management process automation

Cloud Technologies

Prerequisites (derived from the sequence of subjects):

- Introduction to IT

Course content:

- Introduction to cloud services
- Building cloud computing and running a web server
- Introduction to server virtualization
- Working with data warehouses
- Building a database server
- Scaling and load balancing an existing architecture
- Designing cloud services

Advanced Network Technologies

Prerequisites (derived from the sequence of subjects):

- Network Technologies (CCNA)

Course content:

- Concept and selection of selected routing protocols
- Routing relay configuration
- Filtering packet traffic in the network
- Configuring standard ACLs for IPv4
- Configuring Extended ACLs for IPv4
- Static NAT Configuration
- Configuring Dynamic NAT
- Troubleshooting NAT Configuration
- WAN Technology
- Network monitoring protocols
- Network device management

Specialisation: Cybersecurity

Fundamentals of Security Operations (SOC)

Prerequisites (resulting from the sequence of courses):

- Cybersecurity Essentials

Course content:

- SOC—Responsibilities and Role within the Organization in Preventing and Responding to Cybersecurity Incidents
- Key Technologies and Processes in the SOC
- Security policies, security processes, and best practices
- Evaluation of network alerts
- Security management and regulatory compliance
- Evaluation of network security resources
- Introduction to computer forensics
- Endpoint threat assessment
- Introduction to risk management

Security Design and Testing

Prerequisites (resulting from the sequence of courses):

- Cybersecurity Essentials

Course content:

- Network Security Infrastructure
- Overview of the Windows operating system in terms of threats and protection methods
- Overview of the Linux operating system in terms of threats and protection methods
- Overview of physical tools used to conduct IT security audits
- Overview of software used to conduct IT security audits and white-hat intelligence
- Protection of Operating Systems and Endpoints
- Introduction to Firewall Technology
- Introduction to Access Lists
- Analysis of Network Security Incidents

Network Technologies 2

Prerequisites (resulting from the sequence of courses):

- Network Technologies (CCNA)

Course content:

- Introduction to switched networks. Basic concepts and switching configuration
- Virtual private networks (VLANs), configuration, and management
- Routing concepts. Routing between VLANs
- Static and dynamic routing
- Single-area OSPF
- Access control lists (ACLs)
- DHCP. Address translation for IPv4
- Redundancy in Ethernet networks
- Default gateway multiplexing
- Improving network performance using EtherChannel

Network Security

Prerequisites (resulting from the sequence of courses):

- Network Technologies (CCNA)

Course content:

- Introduction to network attack methods and related tools
- Introduction to key methods and tools for protecting against network attacks

- Configuration of administrative access
- Configuration of command authorization and access levels
- Implementation of security management and monitoring of network devices
- Configuration of AAA policies
- Implementation of ACLs
- Implementation of zone-based policies using a firewall and the CLI
- Introduction to IPS/IDS technologies
- Concepts of network signatures
- Endpoint security
- Layer 2 security
- Cryptographic technologies and their practical applications
- Basic data integrity and authentication
- Configuration of site-to-site VPN technologies
- Introduction to ASA technology
- Configuration of the ASA firewall
- Network security testing

Cloud Computing

Prerequisites (resulting from the sequence of courses):

- None

Course content:

- Introduction to AWS IAM
- Setting up a VPC and deploying a web server
- Introduction to Amazon EC2
- Using data storage services
- Setting up a database server
- Scaling and load balancing an existing architecture
- Using selected AWS development services

Ethical Hacking

Prerequisites (resulting from the sequence of courses):

- Operating Systems, Network Technologies (CCNA)

Course content:

- Introduction to Ethical Hacking
- Information Gathering (OSINT)
- Network and Service Scanning
- Vulnerability Identification and Analysis
- Exploiting Vulnerabilities and Local Attacks
- Web Application Security
- Local Network Attacks
- Reporting and Mitigation

Cloud Security

Prerequisites (resulting from the sequence of courses):

- Cloud Computing

Course content:

- Introduction to Cloud Computing and Security
- Identity and Access Management
- Secure Resource and Configuration Management
- Compliance and Audit Management
- Current Security Threats and Trends
- Cloud Infrastructure Security Methods and Techniques

- Data Protection in the Cloud
- Monitoring and Responding to Cloud Security Incidents
- Fundamentals of Cryptography in the Cloud
- Cybersecurity and Risk Management in the Cloud
- Fundamentals of Account Security
- Creating Security Policies for Selected Resources
- Cloud Infrastructure Security
- Secure Data Storage
- Logging and monitoring user activity
- Threat detection and incident analysis
- Configuring compliance rule services
- Implementing secure application scenarios

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		information and communication technology	English for Specific Purposes	Digital Safety and Awareness	Fundamentals of Economics	Personal Business Model	Protection of Intellectual Property	Academic Writing Skills	Technical Drawing	Computer Fundamentals with Internet of Things	Introduction of Mathematics	Mathematical Analysis	Discrete Mathematics	Stochastic Processes & Statistics	Introduction to Algorithms and Discrete Engineering Physics	Linear Algebra	Algorithm-based Data Structures	Introduction to IT	Introduction to Programming	Programming	Object-Oriented Programming	Software Engineering	Computer System Architecture	Operating Systems	Network Technologies (ECNA)	Security and Operational Problems of IT	Computer Graphics	Databases	Introduction to Artificial Intelligence	Programming Project	Human-Computer Communication	Discreet Technology Essentials	Diploma Seminar 1	Diploma Seminar 2	Vocational Apprenticeship part 1 (13 months)	Number of courses covering 4 years learning modules	25	23	Game Engine and Programming Technologies	Marketing and Business Aspects of Games	Discreet Technologies	Cloud Technologies	Advanced Network Technologies	Team Project	Vocational Apprenticeship part 2 (13 months)	Number of courses covering 4 years learning modules	3	Fundamentals of Security Operations (SOC)	Security Design and Testing	Network Technologies 2	Network Security	Cloud Computing	Ethical Hacking	Cloud Security	Team Project	Number of courses covering 4 years learning modules	18																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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symbol	content of the learning outcome	information and communication technology	English for Specific Purposes	Digital Safety and Awareness	Fundamentals of Computers	Personal Business Model	Introduction of Intellectual Property	Academic Writing Skills	Graduation Challenges	Graduation of Mathematics and IT Elements of	Mathematical Analysis	Year 1 Mathematics	Fundamentals of Statistics	Introduction to Electronics and Electrical Engineering	Physics	Law	Algorithms and Data Structures	Introduction to IT	Introduction to Programming	Programming	Object Oriented Programming	Software Engineering	Computer System Architecture	Operating Systems	Network Technologies (CCNA)	Social and Occupational Problems of IT	Computer Graphics	Databases	Introduction to Artificial Intelligence	Programming Project	Human-Computer Communication	Cybersecurity Essentials	Diploma Seminar 1	Diploma Seminar 2	Localisation of Apprenticeship part 1 (3 months)	Number of courses covering a given learning outcome	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	12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